DC-Link Capacitors for Grid Based Inverter Applications

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THE CHALLENGE

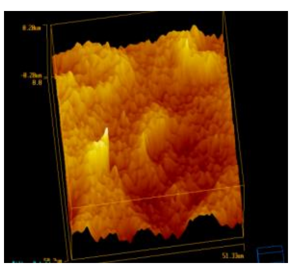
The DC-link capacitor is one of the largest, costliest and most failure-prone components in today's inverter systems

PHASE I PROJECT OBJECTIVES

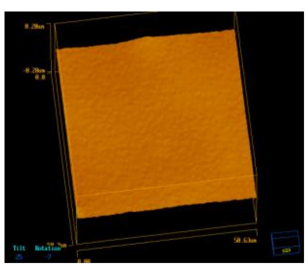
- Increase temperature capability
- Improve life and reliability
- Perform the above without changing the way capacitors are currently manufactured

DEVELOPMENT APPROACH

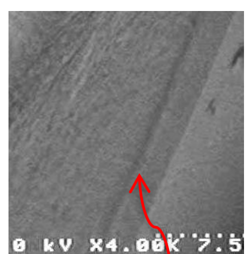
- Convert commercially available capacitor films
- Electron beam cross linked Acrylate polymers
- Pinhole free, breakdown strength 1000V/um
- Temperature 260°C, Dielectric constant k=3.0 to 6.2



AFM of Base Film



Acrylate Coated Film



Acrylate

PHASE I DEMONSTRATED

- 80% to 140% increase in I^2R thermal load capacity before failure
- 0-10% higher breakdown strength
- 10-20% Higher dielectric constant
- 10X higher resistance to corona degradation
- 70% lower ESR
- >10X life at dV/dt of 1000V/μs

PHASE II DEVELOPMENT

- Scale up to a roll to roll pilot line
- Optimize dielectric stack
- Produce 800μF/1000V capacitors
- Demonstrate performance using specific application based capacitor tests

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